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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,040	04/01/2004	Glen Garfunkel	HT03-027	9265

7590 02/06/2008
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EXAMINER

TUGBANG, ANTHONY D

ART UNIT	PAPER NUMBER
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3729

MAIL DATE	DELIVERY MODE
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02/06/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/816,040

Applicant(s)

GARFUNKEL, GLEN

Examiner

A. Dexter Tugbang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 November 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 19, 2007 has been entered.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102

3. Claims 1 through 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Saito et al 6,112,402 and Sato 2002/0191353.

Saito discloses a method to form a magnetically pinned layer comprising: providing a layer of antiferromagnetic material (e.g. 10) having a top surface and an edge that is different from the top surface; and depositing a layer of magnetic material (e.g. 3, 5, 6) by sputtering (col. 8, lines 27+), a part of which contacts both the top surface and the edge (see Fig. 8).

The tri-layer structure (i.e. free magnetic layer 3, nonmagnetic layer 5, pinned magnetic layer 6) of Saito is inherently capable of being a "magnetically pinned layer", thus meeting the limitations of "thereby forming said magnetically pinned layer" (line 5 of Claim 1). As extrinsic evidence, the examiner cites the reference to Sato. Sato specifically states that a tri-layer

structure (i.e. magnetic layer 64, nonmagnetic layer 65, pinned magnetic layer 66, in Fig. 10) is a laminated magnetically pinned layer 34.

Regarding Claim(s) 2 and 3, Saito further teaches that the layer of magnetic material contacts the edge through overlap of the top surface and also comprises a pair of ferromagnetic layers (free magnetic layer 3 and pinned magnetic layer 6, both made of NiFe) separated by, and contacting, an antiferromagnetic coupling layer (e.g. 7).

Claim Rejections - 35 USC § 103

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Saito et al, Sato, Tobise et al 5,748,416 and Gill 6,097,579.

Saito discloses a method of forming a magnetically pinned layer comprising: providing a pair of antiferromagnetic layer (left and right sections of layer 10, in Fig. 7) having coplanar top and bottom surfaces and also having angled inside edges that are different from the coplanar surfaces, the edges being separated; and depositing a layer of magnetic material (e.g. 3, 5, 6) by sputtering that is between, and in contact with, the antiferromagnetic layers (see Fig. 8) and overlaps the inside edges.

It is noted that the separation distance between the edges is less than the track width (lead Tw shown in Fig. 9).

The tri-layer structure (i.e. free magnetic layer 3, nonmagnetic layer 5, pinned magnetic layer 6) of Saito is inherently capable of being a "magnetically pinned layer", thus meeting the limitations of "thereby forming said magnetically pinned layer" (lines 7-8 of Claim 4). As extrinsic evidence, the examiner cites the reference to Sato. Sato specifically states that a tri-

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layer structure (i.e. magnetic layer 64, nonmagnetic layer 65, pinned magnetic layer 66, in Fig. 10) is a laminated magnetically pinned layer 34.

Saito does not teach that the distance that separates the edges is no more than 2 microns. Furthermore, Saito does not teach a step of magnetizing the layer of magnetic material.

Tobise teaches that having the track width at a preferred distance of 3 microns or less (col. 9, lines 23-26) provides such advantages of an increased recording density and limiting Barkhausen noise by optimizing magnetic properties (col. 5, lines 42-50). The 3 microns or less of Tobise meets the claimed range of "no more than 2 microns" as the distance between the edges of Saito is less than the track width distance.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Saito by having the distance separated by the edges no more than 2 microns, as taught by the track width distance of Tobise, to provide the advantages of increased recording density and optimized magnetic properties.

Gill teaches that in depositing a layer of magnetic material (e.g. free layer 410) by sputtering, the layer is also magnetized in a magnetic field to orient the easy axis of all the ferromagnetic layers (col. 7, line 62 to col. 8, line 5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Saito by magnetizing the layer of magnetic material, as taught by Gill, to positively orient the easy axis of the ferromagnetic layers.

5. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Saito et al, Sato, Tobise et al, and Gill, as applied to Claims 4 and 6, and further in view of Hasegawa et al 5,910,344.

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Saito, as modified by Tobise and Gill, discloses the claimed manufacturing method as relied upon above in Claim 4, further including that the layer of magnetic material contacts the inside edges through overlap and further comprises a pair of ferromagnetic layers (e.g. 3, 6) contacting, and separated by, an antiferromagnetic coupling layer (e.g. 5, 7 or 10). The modified Saito method does not mention that the ferromagnetic layers are "antiparallel".

Hasegawa teaches that ferromagnetic layers (e.g. 42, 44) can be "antiparallel" in magnetization directions (see a and b directions in Fig. 3) to induce unidirectional magnetic anisotropy to stabilize the magnetic domain (col. 6, lines 12-18)..

It would have obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Saito, by having the pair of ferromagnetic layers each be magnetically antiparallel in magnetization directions from each other, as taught by Hasegawa, to positively induce unidirectional magnetic anisotropy and stabilize the magnetic domain.

Response to Arguments

6. The applicant(s) arguments with respect to Claims 1 through 6 in the reply filed on November 19, 2007 have been fully considered, but have been met in light of the newly cited reference to Sato above.

In regards to the merits of Hasegawa as applied to Claim 6, the term "antiparallel" would mean *not* parallel or *against being* parallel. So the orthogonal directions of a and b of Hasegawa, as indicated by their arrows, would be antiparallel.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Dexter Tugbang whose telephone number is 571-272-4570. The examiner can normally be reached on Monday - Friday 7:30 am - 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 571-272-4690. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

**/A. Dexter Tugbang/
Primary Examiner
Art Unit 3729**

February 1, 2008